NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/85

LICENSEE EVENT REPORT (LER)

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TITLE (4)

High Pressure Coolant Injection System Inoperability

EVENT DATE (5)			LER NUMBER (6)					REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR		SEQUENTIAL NUMBER		REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES	DOCKET NUMBER(S)
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0 8	2 4	8 5	8 5	—	0 0 8	—	0 0	0 9	2 3	8 5		0 5 0 0 0

OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
N		20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
POWER LEVEL (10)		20.405(a)(1)(i)	50.36(c)(1)	X 50.73(a)(2)(v)	73.71(c)
0 0 6		20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
		20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
		20.405(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	
		20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
	AREA CODE
E. M. Mace, Plant Engineering Supervisor	4 0 2 — 8 2 5 — 3 8 1 1

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	
A	B J	1 6 5	W 2 9 0	Y							

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE)	X NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

At 1502, August 24, 1985, the High Pressure Coolant Injection (HPCI) System was declared inoperable during startup from an extended refueling/IGSCC pipe replacement outage. During surveillance testing to prove auto initiation operability, the turbine tripped on overspeed. Reactor pressure was approximately 940 psig and reactor power was approximately 6% of rated. The reactor had been critical for approximately four days. The HPCI system had been successfully tested at 160 psig at 0735, August 21, 1985. Upon declaration of system inoperability, the active components of the other coolant injection systems and the Automatic Depressurization System were promptly tested and verified operable in accordance with Technical Specifications. Subsequent troubleshooting determined that the electrical connections between the governor control and the governor valve electro-hydraulic servo were in error, causing the governor valve to fail full open. The system was successfully retested and returned to service approximately 25 hours after it was declared inoperable. No Technical Specifications were violated and the event represented minimal safety consequence. Applicable operating procedures have been revised to functionally test the HPCI governor control system during the low pressure surveillance testing. Consequently, this corrective action will prevent recurrence of this event.

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TEXT (If more space is required, use additional NRC Form 366A's) (17)

At 1502, August 24, 1985, the High Pressure Coolant Injection (HPCI) System turbine tripped on overspeed during surveillance testing to demonstrate auto initiation operability. The HPCI system was immediately declared inoperable. Reactor pressure was approximately 940 psig and reactor power was approximately 6% of rated. The reactor had been critical for four days. Startup activities were in progress following an extended refueling/IGSCC pipe replacement outage. The HPCI system had been successfully tested at 160 psig at 0735, August 21, 1985. Upon declaration of HPCI inoperability, the active components of the other coolant injection systems (RCIC, LPCI and both Core Spray subsystems) and the Automatic Depressurization System were promptly tested and verified operable in accordance with Technical Specifications.

Maintenance performed the following actions to effect repair. The governor electronics were calibrated and found satisfactory. Knowing that the electro-hydraulic servo (EGR) had been replaced earlier during the outage as part of equipment qualification (EQ) retrofits, the EGR was again replaced and the turbine retested unsuccessfully. Further troubleshooting found that the two wires between the governor control unit (EGM) and the EGR were reversed at the EGM. With the control wires reversed, the actions of the hydraulic servo and, likewise, the governor valve, were reversed. Upon system initiation the governor valve remained full open, overspeeding the HPCI turbine. The mechanical overspeed trip functioned properly to trip the HPCI turbine and prevent damage. The two EGR wires were reversed and the turbine retested successfully. Approximately twenty-five hours elapsed from the discovery of the failure until the system was returned to service.

The wire reversal occurred during the 1984/1985 refueling/IGSCC pipe replacement outage, most probably during modification activities involving the electronics of the HPCI turbine Woodward governor system. Quality control for the modification consisted of as-building the wiring before removing any components and independent QC inspection to verify proper reconnection. Post-modification acceptance testing to verify proper reconnection consisted of performance of Surveillance Procedure 6.2.2.3.17, HPCI Control System Calibration Test. Part A of the procedure had been performed. Part B of the procedure required HPCI operation at 3000 to 3500 RPM and was scheduled to be performed in conjunction with the auto initiation test. After repair and successful retest of the system, Part B of the surveillance was performed successfully.

A review of the equipment history file was performed and no evidence of previous EGR wire reversal was found.

It is important to note that when the HPCI system was tested three days before at 160 psig, the wire reversal was not detected. The Surveillance Procedure used to verify HPCI operability at 150 psig (6.3.3.1) instructs the operators to set the flow controller at rated flow, 4250 gpm. The valves are aligned such that the pump discharges through a restricting orifice and back to the Emergency Condensate Storage Tanks. This is referred to as the "test loop" and is designed to simulate a discharge to the reactor vessel under rated conditions. At rated reactor pressure, HPCI will deliver 4250 gpm at a discharge pressure of 1060 psig in the test mode. At a reactor pressure of 160 psig, HPCI will deliver 3350 gpm at a pressure of 670 psig in the test mode. Because the controller is set at 4250 gpm, the governor valves are not required to throttle if reactor pressure is only 160 psig. However, if HPCI was

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TEXT (If more space is required, use additional NRC Form 366A's) (17)

actually initiated to inject to the reactor vessel at a reactor pressure of 160 psig, the pump would easily achieve 4250 gpm and the governor valves would be required to throttle to avoid overspeeding the turbine. If the EGR was nonfunctional, the turbine would trip on overspeed. In summary, any failure of the governor system which would cause the governor valve to fail open would not be detected by a rated flow test in the test mode at a reactor pressure of 150 psig.

To prevent recurrence, a procedure change has been effected so that any similar failure in the future would be discovered during performance of the HPCI operability test at 150 psig. The procedure (6.3.3.1) will require that following the rated flow test the operator adjusts the flow controller setpoint to decrease flow by 500 gpm. Pump runback and flow stability is then verified. This will functionally test the entire flow control and governor subsystem.

Nebraska Public Power District

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CNSS850550

September 23, 1985

U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

Dear Sir:

Cooper Nuclear Station Licensee Event Report 85-008 is forwarded as an attachment to this letter.

Sincerely,

P. V. Thomason
Division Manager of
Nuclear Operations

PVT:lb
Attach.
cc: R. D. Martin
L. G. Kuncl
J. D. Weaver
L. R. Berry
INPO Records Center
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